



A problem of placing a large processing burden on a computer also arises.

#### SUMMARY OF THE INVENTION

It is therefore an object of the invention to provide a print system for enabling the processing burden on a computer to be lightened and a print job stored in an archive to be reprinted with the format or the number of copied changed as many times as necessary for enhancing the user's convenience and the ease-of-use of the print system.

The following print systems and methods are adopted in the present invention.

A first print system according to the invention comprises a computer and a printer connected directly to the computer or indirectly to the computer via a network, characterized in that a logical printer driver makes print instructions of a prepared document, prepares a PDL document and print information from the document, and spools as a print job, that a spool control section transfers the spooled print job to a PDL processing section, which then processes the PDL document in accordance with the print information and transfers the PDL document to an interpreter, which then interprets the PDL document, expands the PDL document into a dot image, and stores the dot image in an output work, and that an output control section sends the dot image to a print engine for printing the document in the specified format from the computer.

A second print system according to the invention is

characterized in that a spool control section stores a print job in an archive, that a computer makes print instruction through a print instruction section, that the print instruction section updates print information of the print job, that an archive control section spools the print job, that a spool control section transfers the spooled print job to a PDL processing section, which then processes the PDL document in accordance with the print information and transfers the PDL document to an interpreter, which then interprets the PDL document, expands the PDL document into a dot image, and stores the dot image in an output work, and that an output control section sends the dot image to a print engine for reprinting the print job stored in the archive in the specified format from the computer.

A third print system according to the invention comprises a computer and a printer connected directly to the computer or indirectly to the computer via a network, characterized in that a logical printer driver makes print instructions of a prepared document, prepares a PDL document and print information from the document, and spools as a print job, that a spool control section transfers the spooled print job to an interpreter, which then interprets the PDL document, expands the PDL document into a dot image, and stores the dot image in an output work, and that an output control section stores the dot image stored in the output work and the print information in an archive as the print job.

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A fourth print system according to the invention is characterized in that a computer makes print instruction through a print instruction section, that the print instruction section updates print information of a print job, that an archive control section spools the print job, that a spool control section transfers the spooled print job to a dot image processing section, which then processes dot image in accordance with the print information and stores the dot image in an output work, and that an output control section reprints the print job stored in archive in the specified format from the computer.

A fifth print system according to the invention is characterized in that a computer makes print instruction through a print instruction section, that the print instruction section updates print information of a print job, that an archive control section spools the print job, that a spool control section transfers the spooled print job to a PDL processing section if the print data is PDL and the spooled print job to a dot image processing section if the print data is a dot image, that the PDL processing section processes the PLD in accordance with the print information and stores the PDL in an output work, that the dot image processing section processes the dot image in accordance with the print information and stores the dot image in the output work, and that an output control section sends the dot image to a print engine for reprinting the print job stored in archive in the

specified format from the computer.

A sixth print system according to the invention is characterized in that an archive is provided for storing a pair of PDL document and printer information and a pair of dot image and print information as print job and that the print job stored in the archive is reprinted in the specified format from a computer.

A seventh print system according to the invention is characterized in that a computer calls standard print information of a print job existing in an archive or already registered print information from a print instruction section and changes based on the called information for registering and using a plurality of pieces of print information for one print data piece with another name or by overwriting.

An eighth print system according to the invention is characterized in that a computer selects print information registered in a print job existing in an archive from a print instruction section and reprints the print job in the format of the print information.

A ninth print system according to the invention is characterized in that a computer sends a reprint instruction to an archive control section from a print instruction section, that the archive control section describes the storage location of print data in print information and spools only the print information through a spool control section, and that a dot image processing section or a PDL processing section accesses



for processing a PDL and a dot image.

FIG. 14 is a drawing to show the detailed print instruction contents.

FIG. 15 is a drawing to show a general format of a document registered in an archive.

FIG. 16 is a drawing to show a state in which print information is added to the document in FIG. 15.

FIG. 17 is a drawing to show a data flow for moving only print information to a spool for reprinting.

FIG. 18 is a drawing to show an instruction screen for reprinting the document in the archive.

FIG. 19 is a drawing to show a screen produced by selecting standard print information on the instruction screen in FIG. 18.

FIG. 20 is a drawing to show a detailed instruction screen displayed resulting from selecting a detail button on the instruction screen in FIG. 18.

FIG. 21 is a drawing to show a state in which setting is changed on the detailed instruction screen in FIG. 20.

FIG. 22 is a drawing to show a screen for specifying page assignment as the next screen to the detailed setting in FIG. 21.

FIG. 23 is a drawing to show a state in which a new print information name is entered to register setup print information.

FIG. 24 is a drawing to show a state in which the print



discussed with FIG. 2. The computer 300 comprises a print instruction section 303, an application 301, and a logical printer driver 302. To print a document prepared in the application 301, the logical printer driver 302 is used for instruction.

The instruction contents will be discussed in detail with FIG. 6. The instruction contents include a print mode 800, a storage format 820, the number of copies 820, a paper size 830, a paper feed section 840, a paper discharge section 850, an output format 860, a double-sided print 870, a binding position 880, and a staple 890. The print mode 800 is further classified into print 801 and storage 802. The print 801 specifies whether or not a print job transmitted to the printer 100 is to be printed on a paper. The print job represents data required for being printed by the printer. The storage 802 specifies whether or not a print job transmitted to the printer 100 is to be stored in the printer 100. The storage format 810 is classified into a PDL (page description language) 811 and a dot image 811. The PDL 811 specifies whether or not a PDL document is to be stored. The dot image 812 specifies whether or not a dot image which is a format capable of being output to the printer engine is to be stored. The number of copies 820 sets the number of print copies. The paper size 830 sets the paper used for the printing. The paper feed section 840 specifies which of paper storage units to store papers to be printed in the printer 100 is to be used. The





in the printer 100 (Setting contents = Yes), the storage format 810 is checked. If the PDL 811 is not set to store the PDL document (Setting contents = No), no operation is performed. If the PDL 802 is set to store the PDL document (Setting contents = Yes), the print job 1300 is copied into an archive 202 and is stored therein. Next, the print 801 is checked. If the print 801 is not set to print the print job onto the sheet (Setting contents = No), no operation is performed. If print 801 is set to print the print job onto the sheet (Setting contents = Yes), the print job 1300 is sent to a PDL processing section 206, which then processes the print job 1310 in accordance with the output format 860 in the print information 1320. Here, as a processing example, processing of 2UP will be discussed with FIGS. 7 and 8. First, the format of the print data 1310 of the PDL will be discussed. The print data 1310 is in a general PDL format as shown in FIG. 7. The print data 1310 begins with a header 910. Generally, a print execution user name, application name, and the like are described in the header 910. The header 910 is followed by data concerning page 1 (920) to page N (950). The data concerning each page is similar and the page 1 (920) is used to describe the format. The page 1 (920) comprises drawing data 921 describing drawing on the page 1 in a programming language and an output instruction 922 indicating the end of the page 1 (920). If the page 1 (920) does not contain the output instruction 922, it is not output even if the drawing data 921 is executed. FIG.

8 shows the print data 1310 in FIG. 7 processed to the 2UP. Since an output instruction 1022 is deleted, drawing data 1021 is not output and subsequently drawing data 1031 on page 2 (1030) is executed. Since the page 2 (1030) contains an output instruction 1032, here the drawing data 1021 on page 1 (1020) and the drawing data 1031 on the page 2 (1030) are output together. Likewise, the subsequent data is output for two pages at a time upto page N (1050).

The print job 1300 thus processed is sent to an interpreter section 207, which then expands the print job 1300 into a dot image of a format that can be output to a print engine 500, and stores the dot image in an output work 209. When the dot image is stored in the output work 209, the output control section 208 outputs the dot image output to the print engine 500. Hitherto, the logical printer driver 302 has processed the print data 1310, thus a large processing burden has been placed on the computer, taking time until the release of the print processing. According to the invention, the print data 1310 is processed in the printer 100, thus the processing burden on the computer 300 is lightened and the print processing time is shortened.

Next, a method of again printing the print job 1300 stored in the archive 202 will be discussed.

To again print the print job, the print instruction section 303 is used for instruction. The instruction contents are the same as those previously described with reference to



application as many times as required.

A second embodiment of the invention will be discussed in detail with reference to FIG. 12.

~~As shown in FIG. 12, a print job 1300 prepared by a logical printer driver 302 is stored in a spool 204 and is sent to an interpreter section 207, as previously described in the first embodiment. The print data of the sent print job 1300 is converted into a dot image and print data 1310 is overwritten with the print data in the dot image, then the print data in the dot image is stored in an output work 209. An output control section 208 interprets print information 1320. First, the print information 1320 is checked on a print mode 800. If the storage 802 is not set to store the print job in the printer (Setting contents = No), no operation is performed. If the storage 802 is set to store the print job in the printer (Setting contents = Yes), a storage format 810 is checked. If the dot image 812 is not set to store the dot image (Setting contents = No), no operation is performed. If the dot image 812 is set to store the dot image (Setting contents = Yes), the print job 1300 is copied into an archive 202 and is stored therein. Next, the print 801 is checked. If the print 801 is not set to print the print job onto the sheet (Setting contents = No), no operation is performed. If the print 801 is set to print the print job onto the sheet (Setting contents = Yes), the print job 1300 is sent to a dot image processing section 205, which then processes the~~

print job 1310 in accordance with an output format 860 in the print information 1320. Here, as a processing example, processing of the 2UP will be discussed with FIGS. 9 and 10. First, the format of the print data 1310 of dot image will be discussed. The print data 1310 is in a general dot image format as shown in FIG. 9. The print data 1310 begins with a header 1110. Generally, a print execution user name, application name, and the like are described in the header 1110. The header 1110 is followed by data concerning page 1 (1120) to page N (1150). The data concerning each page is similar and the page 1 (1120) is used to describe the format. The page 1 (1120) consists of page 1 drawing data 1122 describing drawing on the page 1 in a binary format and page 1 drawing data size 1121 indicating the size of the data. FIG. 10 shows the print data 1310 in FIG. 9 processed to the 2UP. New page 1 (1220) comprises a listing of the page 1 (1120) and page 2 (1130). New page 1 drawing data size indicates the total size of the page 1 drawing data size 1121 and page 2 drawing data size 1131, and new page 1 drawing data 1222 is provided by combining the page 1 drawing data 1122 and page 2 drawing data 1132. Likewise, the subsequent data is arranged for two pages at a time to new page N/2 (1150). The print job 1300 containing the print data 1310 thus processed is sent to the output work 209. The output control section 208 outputs the print data 1310 to a print engine 500 in accordance with the print information 1320. Thus, needs for outputting in various formats in response to the

application in the print system are high and the dot image needs to be processed. However, it is extremely difficult to restore the combined and processed dot image to the original or convert the combined and processed dot image into a different format. Hitherto, stored print data has already been processed and unable to be again printed in a different format and has been again printed only in the stored format. To print the print data in a different format, it has been necessary to again output the print data from the beginning from application. In the invention, to store the print job, the standard print job is stored as the original and when the print job is actually printed, the print data is processed in accordance with the print information, whereby the print job can be reprinted in the format responsive to the application as many times as required. The dot image is in the format in which it can be output to the printer engine intact, and the dot image is stored in the format, thus making it possible to print the dot image at high speed.

A third embodiment of the invention will be discussed in detail.

As shown in FIG. 13, a print system of the third embodiment has both the PDL processing section 206 described in the first embodiment and the dot image processing section 205 described in the second embodiment and can store either or both of PDL and dot image in an archive 202. Generally, the PDL has the advantage that if data in the PDL is enlarged or reduced, image

quality degradation is small, etc., but has the disadvantage that data in the PDL is converted into a dot image by an interpreter 207 and thus the print time is prolonged, etc. The dot image has the advantage that the dot image is in the format in which it can be output to a printer engine intact and thus the print time is short, etc., but has the disadvantage that if the size is change, image quality degradation is large, etc. In the invention, full advantages of both the PDL and the dot image are taken; if the PDL is used, reprinting can be executed with high priority given to the image quality and if the dot image is used, reprinting can be executed at high speed.

A fourth embodiment of the invention will be discussed in detail.


First, the reprinting procedure described in the first embodiment, the second embodiment, the third embodiment will be discussed using an example. As shown in FIG. 15, Document1 (1610) is stored in an archive 202 as a job. Reprinting instructions from a computer 300 to a printer controller 200 are given using instruction screens shown in FIGS. 18, 20, 22, and 25, for example. First, a document to be reprinted is selected. FIG. 25 shows an instruction screen for selecting a document in the archive. Directories Dir11 (2111) and Dir12 (2112) exist under a directory Dir1 (2110). Further, files Document1 (2120), Document2 (2121), and Document3 (2122) exist under the directory Dir11 (2111). Here, for example, the Document1 (2120) is selected. The file Document1 (2120) is





information name 3410 shown in FIG. 24. The "standard print information" is thus used as a setting model, whereby it is made possible to save print information setting time and trouble. More than one frequently used print setting is registered, whereby it is made possible to reprint with dispatch.

Next, a fifth embodiment of the invention will be discussed in detail.

  
First, ~~the reprinting procedure described in the first~~ embodiment, the second embodiment, the third embodiment, the fourth embodiment will be discussed using an example. FIG. 17 is a state diagram to show storing of Document1 (1610) in an archive 202 as a print job. The Document1 (1610) is made up of print data 1611 and added print information 1612 and print information 1 (1613) as print information. When a reprinting instruction of the Document1 (1610) is given from a computer 300, a spool control section 203 moves print information to a spool 204. For example, if "print information 1" is selected in a print information name 3410 on an instruction screen in FIG. 24, the contents of the print information 1 (1613) are, for example, as shown in FIG. 26. A dot image processing section 205 or a PDL processing section 206 interprets the print information 1 (1613) and processes print data in the storage location indicated in a print data storage location 3140. Thus, the spooled print job contents are print information only and print data of a comparatively large data size is accessed after

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~~the location of the print data is found from the print information, whereby it is made possible to reduce the copy time and the hard disk capacity.~~

When a print instruction is given with various instructions, it is made possible to lighten the processing burden on the computer and shorten the print processing time required for the computer.

A print job is stored in the archive, whereby it is made possible to reprint the print job in the format responsive to the application as many times as required.